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PHOTOGRAPHIC INTERPRETATION REPORT

**DNEPROPETROVSK MISSILE DEVELOPMENT
AND PRODUCTION CENTER
DNEPROPETROVSK, USSR**

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JUNE 1966
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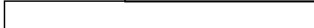
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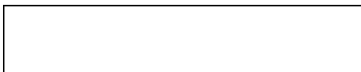
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PHOTOGRAPHIC INTERPRETATION REPORT

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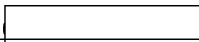


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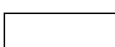
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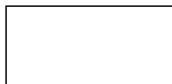
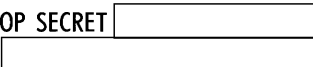
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TABLE OF CONTENTS

	Page
Summary and Conclusions	1
Introduction.....	1
General Description.....	1
History and Products.....	3
Plant 188	3
Plant 192	3
Test Facility.....	6
Principal Test Facility Structures.....	6
Test Facility Annex.....	14
References	16

LIST OF ILLUSTRATIONS

	Page
Figure 1. Location Map (drawing)	1
Figure 2. Dnepropetrovsk Missile Development and Production Center (photograph)	2
Figure 3. Plant 186 (photograph).....	4
Figure 4. Plant 186 (drawing).....	5
Figure 5. Possible Testing/Assembly and Checkout Building (perspective drawing)	6
Figure 6. Plant 192 (photograph and drawing)	7
Figure 7. Test Facility and Annex (photograph)	8
Figure 8. Test Facility and Annex (drawing)	10
Figure 9. Possible Structural Test Facility and Possible Hydrostatic or Structural/Vibration Test Facility (perspective drawing).....	12
Figure 10. Duplicate Probable Calibration Test Facilities (perspective drawing)	12
Figure 11. Probable Calibration Test Facility (perspective drawing).....	13
Figure 12. Probable Altitude Simulating Test Facility (perspective drawing).....	13
Figure 13. Two-Position Test Stand (perspective drawing)	14
Figure 14. Single-Position Test Stand (perspective drawing).....	14



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SUMMARY AND CONCLUSIONS

The excellent interpretability of the [] photography of the Dnepropetrovsk Missile Development and Production Center revealed new construction and additional details of structures which were present but not fully visible previously.

At the 3 components of the center, the principal construction activity since [] included the following: at Plant Post Box 186, a number of medium-size and small structures, some complete and some still under construction in [] at Plant Post Box 192, the completion of a large fabrication/assembly building and several smaller structures; and, at the Test Facility, a number of probable test structures in the southwest section, some of which were still under construction [] Rail lines serving the 2-position "hot-fire" test stand near the center of the Test Facility were visible, and new rail spurs had been added to the east end of Plant Post Box 186.

A number of conclusions can be drawn from the photographic evidence, and some of these are further supported by available collateral information.

The Dnepropetrovsk Missile Development and Production Center is probably engaged in the series production and testing of ballistic missiles, including engines, airframes, tanks, and other major components. The size, elaborateness, diversity, and duplication of testing structures in the Test Facility support the belief that production testing is a major function of this installation. The same characteristics of the Test Facility combined with the very extensive production facilities within both manufacturing plants indicate

that more than 1 missile system could be produced and tested concurrently.

The conclusion that the main function of the Test Facility is production testing is further supported by the presence of the well-developed rail network serving the center and a large probable packing and shipping facility in the testing area. Although a certain amount of research and development activity is inherent in any large-scale missile testing program, it is believed that the combination of 2 large manufacturing plants and a testing facility apparently designed to be extensive and elaborate enough to support both plants can best be interpreted as an integrated series production and testing installation with a multisystem capability.

The construction of new test facilities observed on the [] photography may indicate a shift in emphasis from production testing to research and development testing; however, this new construction may signify only the imminent series production of a new or additional missile system or systems at the center.

INTRODUCTION

General Description

The Dnepropetrovsk Missile Development and Production Center (DMDPC) [] is located on the southern edge of the city of Dnepropetrovsk, USSR, at geographic coordinates 48-26N 34-59E (Figure 1). The DMDPC consists of 3 separately secured but contiguous facilities that together occupy about 1,000 acres of land (Figure 2). Two of the facilities are manufacturing plants—Plant Post Box 186 (Plant 186), the larger

of the two, and Plant Post Box 192 (Plant 192); the third component is the Test Facility, which adjoins Plant 192 on the southwest.

The excellent interpretability of the [] photography of [] revealed construction activity in all 3 components and permits a more detailed description of the older structures than has been possible previously. This report updates and expands upon a report published in [] which was based on [] photography through [] 1/ The 3 components are described in individual sections of this report; a table of building dimensions and roof coverages accompanies the line drawing of each component.

Plant 186 occupies a secured area of approximately 550 acres; Plant 192 occupies a secured area of about 160 acres; and the Test Facility, also secured, occupies an area of about 290 acres. The 3 secured areas are each served by a road and a rail network. The rail nets, which are tied into the main Dneprodzerzhinsk-Zaporozhye-Dnepropetrovsk-Kharkov rail lines, are more prominent than the roads and probably serve as the principal means of interfacility transportation. Trucks, however, are probably used extensively within the 3 areas. There are no direct rail or road connections between the 2 manufacturing plants nor between either of the plants and the Test Facility; the individual road and rail nets join the main systems serving Dnepropetrovsk outside the secured areas of the DMDPC (Figure 2). Although this means that products of either of the plants scheduled for testing would have to leave the secured area enroute, it also means that shipments could enter or leave any one of the 3 areas without passing through

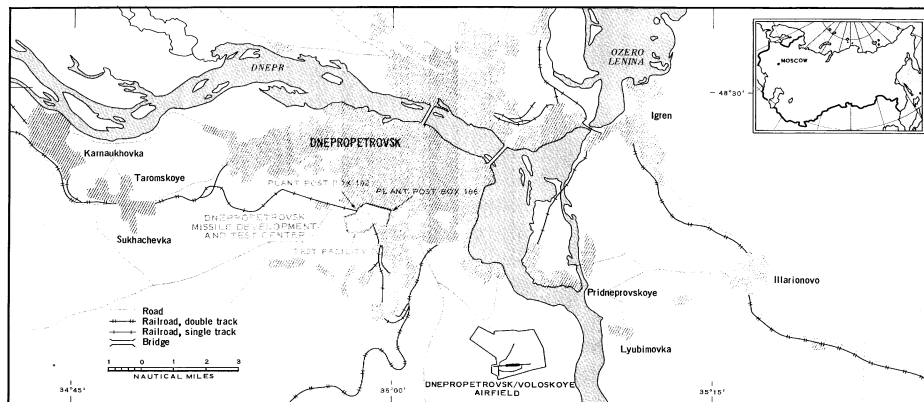


FIGURE 1. LOCATION MAP.

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FIGURE 2. DNEPROPETROVSK MISSILE DEVELOPMENT AND PRODUCTION CENTER

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either of the other two.

Power for the DMDPC is available from the power facilities in Dnepropetrovsk as well as from a large steam and powerplant located in the southern part of the Plant 186 area. Abundant water is available from onsite wells and from the Dnepr River nearby; a small reservoir, possibly used for treatment of contaminants, is located in the southern part of the Test Facility area.

History and Products

Plant 186, also known as DAZ (Dnepropetrovsk Automobile Plant), is the oldest of the 3 components; construction began around 1944 and was completed after World War II, the postwar plan reportedly calling for the large-scale production of trucks. 2/ Plant 192 and the Test Facility were added subsequently; it appears possible that Plant 192 was designed and built for missile manufacturing purposes although this cannot be confirmed.

About the time construction of Plant 186 was completed, the plant apparently came under the control of the Ministry of Defense Industry, ultimately becoming a principal producer of missiles and missile components; initial missile-related activity began about 1951 with the production of rocket engines. 2/ Probably as a result of the 1953 agricultural decrees, the plant began the production of tractors, and it is believed that this civilian production continued through 1965; civilian production at Plant 192 was believed to include refrigerators. 2/ It appears reasonably certain, however, that the DMDPC has been primarily engaged in the production and testing of rocket engines, missile components, and probably complete missile systems since the mid-1950s; limited missile-related activity probably began several years prior to that time, particularly with respect to rocket engines.

It is believed that the center produced the SS-3, SS-4, and probably the SS-1B missiles through 1960 and, in addition, was involved in the development of the Series 61 and 63 missile systems. 3/ It is also believed that the DMDPC was involved in the development of the SS-7 ICBM and probably with that of the SS-5. 3/ Production of the SS-5 began in the fall of 1961, and series production of the SS-7 began in early 1962, continuing until it was phased out in 1964. 2/ It was believed in January 1966 that the then current production consisted of the SS-9 and the SS-12, and that possibly the SS-11 would soon enter series production, if it had not already done so. 2/

PLANT 186

Plant 186 (Figures 3 and 4) is the largest and oldest of the components of the DMDPC; its structures have a total roof coverage of almost 5 million square feet. Plant 186 is a large fabrication/assembly plant with an intricate rail network, abundant warehousing and open storage space, a large thermal steam and powerplant, and considerable administration and laboratory space. The item numbers used in the following paragraphs are keyed to Figure 4, which includes a table of building dimensions; this figure

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also depicts the approximate construction chronology of the plant.

The most significant construction in Plant 186 since [redacted] includes item 17, an addition to item 1, and a number of smaller structures.

Receiving, unloading, and warehousing operations are largely confined to the west end of the plant area (items 25, 26, 27, and adjacent structures) and to the small buildings and warehouse-type structures north and west of item 1. Items 16 and 17 are the most probable locations of the forge, foundry, and possibly the heat-treating operations. The steam and powerplant (item 14) probably provides the heat, steam, and at least part of the electric power for the whole DMDPC. The principal office space in the plant area is probably located in items 8 and 9, the 2 medium-sized buildings north of item 6, and the building east of item 10. Item 23 could be either an engineering laboratory or a fabrication facility for small items such as electrical/electronic parts.

The 3 east-west lines of very large fabrication/assembly buildings (items 1, 2, 3, 5, and 6; items 20 and 21; and items 10, 11, 15, 18, 19, and 22) constitute the main production facilities in the plant. Item 4 is also a production building, and item 7 appears to be the end point of a production line inasmuch as it is rail served and has a large overhead traveling crane spanning the courtyard formed by 3 buildings and their connecting walls.

Item 5 has a tower section measuring [redacted] which rises 100 feet above the building roof, indicating a vertical missile airframe assembly operation or possibly the manufacture, test, and assembly of tanks and pipe systems. Item 12 (Figure 5) is a complex structure with an integral tower section forming one corner; the tower measures 55 feet square and 135 feet high. Hydrostatic testing of missile tanks, alignment testing, or vertical assembly and checkout seem to be the most likely operations in this structure.

There is at least 1 relatively new structure in the extreme southeast corner of the plant area; it is a shed-type building with a pair of small silos or similar structures against its north wall. Because of the presence of the silos, it is possible that this building is used for hydrostatic testing of small tanks of the type used for fuel and oxidizer in upper rocket stages or in small liquid fuel rockets. A structure possibly related to the one with the silos is located immediately to the northwest; this is a small, low building with 2 square tower sections, one quite low and the other 30 to 35 feet high.

A considerable amount of raw materials, including sand and gravel, is piled in the southern and southeastern parts of the plant area, and there are some indications that the rail spur which passes between items 8 and 9 may be extended southward to serve the southeast corner. The general southeast section of the plant includes a number of small buildings, a medium-sized L-shaped building with associated small vertical tanks or columns, a small tank farm, 2 large semiburied tanks, and a walled enclosure containing several horizontal tanks. This enclosure is of in-

terest because the number and sizes of the tanks observed have been different on the various photographic missions, indicating that these are possibly missile fuel/oxidizer tanks or airframes.

Open storage yards and significant crane facilities are annotated on Figure 4. Vehicles, including 560 probable tractors, and railway rolling stock visible in [redacted] are annotated on Figure 3; the probable tractors were systematically arranged in a secured, paved freight loading area at the extreme western end of Plant 186.

PLANT 192

Plant 192 is located between Plant 186 and the Test Facility (Figure 6). The plant consists of a walled production area and an unsecured area adjacent to it on the east, designated as the Plant 192 Annex; the annex area appears to be used for administration, laboratory, and engineering activities. Several of the facilities in the Plant 192 Annex are separately secured, and there is considerable open space that is used for parking and storage. Numerous vehicles, including trucks and cars, can be seen in the open spaces on the [redacted] photography. The item numbers used in the following paragraphs are keyed to Figure 6, which includes a table of building dimensions; this figure also depicts the approximate construction chronology of the plant.

The most significant construction in Plant 192 since [redacted] included the completion of items 2 and 5 and the addition of several smaller buildings.

The most prominent structures in Plant 192 proper are 2 fabrication/assembly buildings (items 5 and 8). Item 5 is the newer, having been completed in 1964. Item 8 is extraordinarily large, covering about 14 acres; the high bay, which extends about two-thirds the length of the building on the north side, is approximately [redacted]. The size and configuration of item 8 indicate that this is probably a final assembly facility for missiles or missile airframes. Because irregular white staining is visible on the roof in the vicinity of the high bay, it is possible that a paint shop is operated in the building.

A probable 3-position forced draft cooling tower is adjacent to the perimeter wall, south of the west end of item 9; by [redacted] this structure had been completed or was nearing completion. At the same time, a new building was under construction between the cooling tower and the west end of item 9; ditches and a tank below grade level were visible in the construction area. A probable earth-covered structure is situated immediately east of the cooling tower.

Large quantities of various materials are stacked along the rail spur in the vicinity of items 1, 3, 4, and 6 and westward to the point where the spur passes through a gate in the security wall. Some of this material appears to be crates and boxes, but the bulk of it looks like ragged or irregular bales of materials such as scrap sheet metal, piled [redacted] in long rows parallel to the railroad. Although a small portion of the material is dark gray,

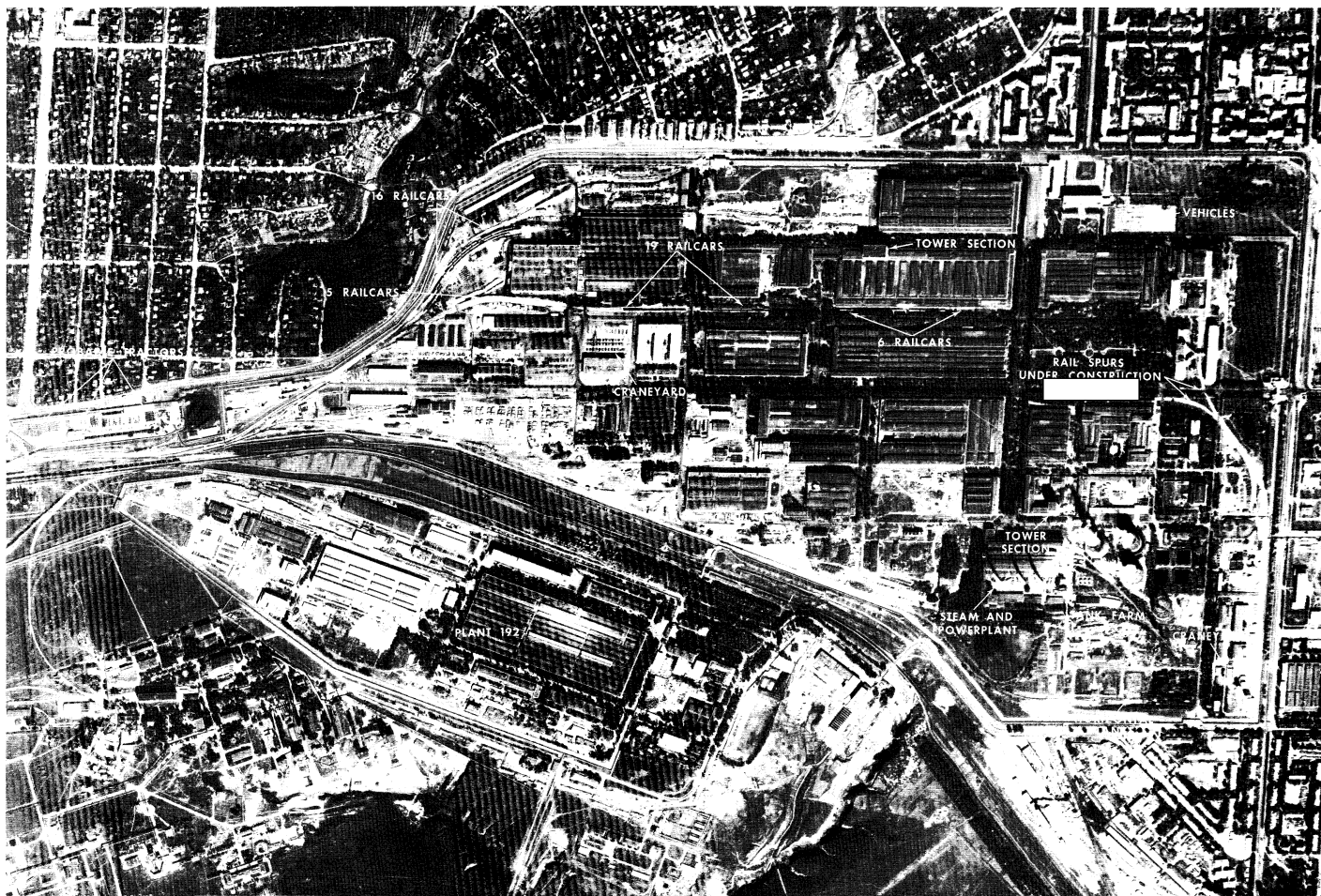
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FIGURE 3. PLANT 186.

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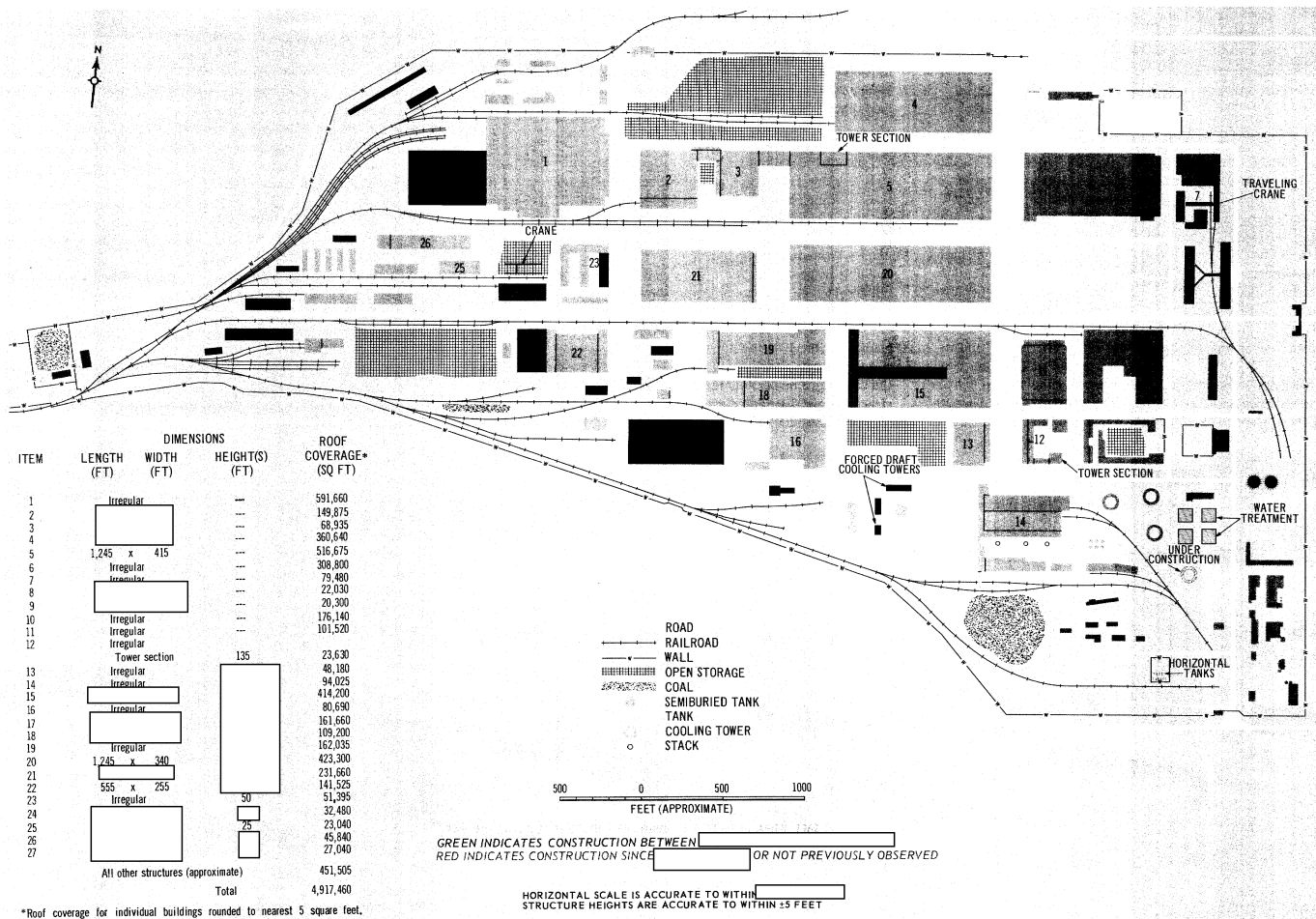


FIGURE 4. PLANT 186, LAYOUT AND ROOF COVERAGE.

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most of it ranges from light gray to white in tone.

A large parking area is located near the southwest corner of the plant. The [] photography revealed approximately 140 trucks, trailers, and possibly other objects arranged in orderly rows in this parking area.

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TEST FACILITY

The DMDPC Test Facility and the associated Test Facility Annex east of the main security wall are located southwest of Plant 192 (Figures 7 and 8). This large test complex contains many different types of testing structures as well as several duplicate sets of facilities, indicating that the Test Facility has the capability to test not only a large quantity of missile and rocket engine components but also a variety of designs; these indications support the conclusion that the 2 manufacturing plants produce and assemble components for more than 1 missile system concurrently.

Figure 8 is a topographic map of the Test Facility and its annex; a table of building dimensions is included. The item numbers used in the following paragraphs are keyed to Figure 8. This figure is also annotated along the major overhead pipelines with the distances from road level to the top of the pipeline at various

points. The construction chronology depicted on Figure 8 is only approximate because of the limited interpretability of the photography prior to [] many of the small structures shown as having been built since [] may have been present before that time. A significant number of sizeable buildings, however, have been added since []

Principal Test Facility Structures

Detailed descriptions of the principal structures within the Test Facility proper are presented below. Buildings in the Test Facility Annex are described in a separate section.

Item 1 consists of a large building; 2 small structures, one east and the other south of the main building; and 2 apparent pump-houses located approximately 500 feet north and south of the main building respectively. The pump-houses are connected to the main building by large-diameter (approximately 5-foot) overhead pipelines which apparently convey water. The main building was erected on a flat surface which had been excavated appreciably below the level of the adjacent terrain; it is served by both rail and heavy-duty road. A probable steamline enters the east end of the building; 3 moderately tall metal stacks and 3 smaller columnar structures are distributed evenly along the north side of the building. The presence of this equipment indicates heat and fume ex-

haust and the possibility of fractionating columns or air filters. The 2 overhead probable water supply lines, though apparently unusually large, could supply coolant for large compressors used in the production of cryogenics through either an air liquefaction process or by compression of gases shipped in from another site. The possible elements which might be liquefied include oxygen, nitrogen, helium, and hydrogen; helium is produced in the general vicinity of Dnepropetrovsk. The [] photography revealed a large probable tank trailer parked on the loop road, adjacent to the south side of the main building.

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Item 2 is a complex 3-level structure surrounded by a heavy-duty loop road system (Figure 9). A probable steamline enters the south side of the building, and 8 ventilators are visible on the roof of the highest of the 3 levels. A large open steel framework is attached to the east side of the building, the top of the framework being a few feet lower than the highest roof level. This framework extends along the entire length of the building and may be either a framework to support missiles/stages for structural testing or an addition still under construction. The former is more probable because of the presence of an apparent drive-through road. At least 4 columnar objects with open ends are evenly spaced at the juncture of the building proper and the open steel framework. The tops of the columns are just below the level of the top of the "roof" section of the framework.

Item 3 is a complex, multilevel structure which was still under construction in [] The most distinguishing feature of this building is the presence of 2 vertical, rectangular bays which extend through the top of the highest section [] These bays were open on the eastern side at the time of the [] photography, and a large tank was being buried just north of the building at the same time. There are 2 possible identifications for this facility: it may be a 2-bay vertical "mis-alignment" tower in that it resembles somewhat a tower of this type at the Azusa, California, facilities of Aerojet-General Company, or it may be designed to fire small or medium-size rocket motors or stages upward, the tank being buried possibly intended for fuel or oxidizer supply.

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Items 4 and 5 are the tallest structures in a group of buildings situated around a loop road (Figure 10). This group comprises 2 duplicate test facilities on opposite sides of a central building located at the junction of the loop road with the Test Facility road system. Items 4 and 5 are each probably a vertical arrangement of 5 to 7 large, horizontal, low-pressure tanks stacked one above the other. In addition to one of these tall structures, each of the duplicate facilities also includes 3 buildings, a small vertical tank or very small building, and a lined rectangular sump or pit; all the structures in each facility are interconnected by overhead water and/or steam pipelines. The central building, probably housing compressors or pumps, measures 60 by 45 feet and has 8 thin pipe stacks or vents projecting through the roof. The heavy-duty loop road widens to form paved parking aprons on all sides of

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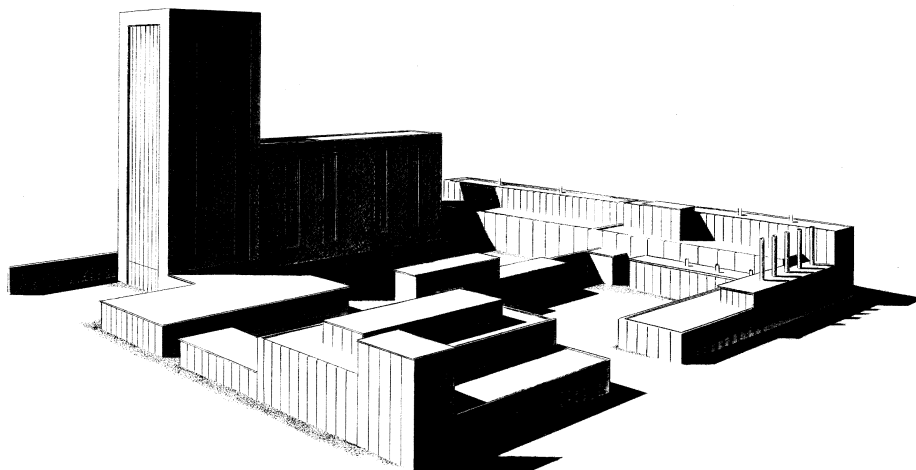


FIGURE 5. ARTIST'S CONCEPTION OF POSSIBLE TESTING/ASSEMBLY AND CHECKOUT BUILDING (item 12, Figure 4).

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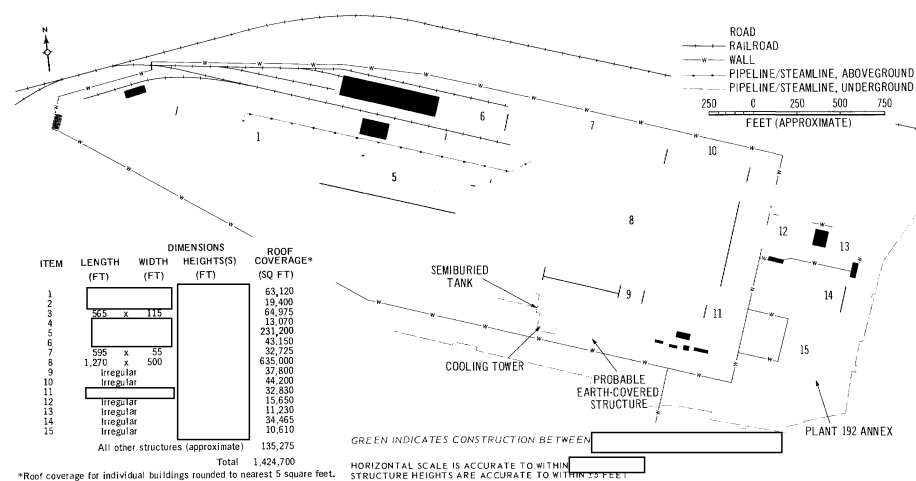
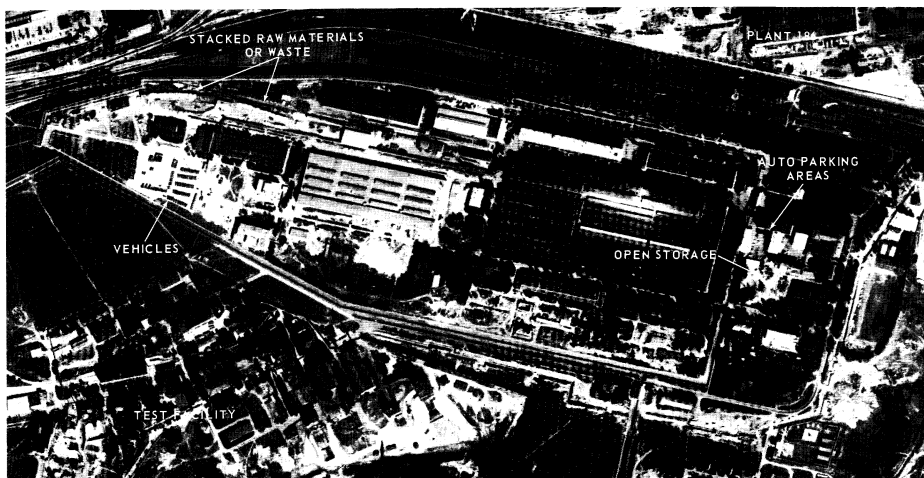


FIGURE 6. PLANT 192, LAYOUT AND ROOF COVERAGE.

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items 4 and 5. A precise identification of this pair of facilities cannot be made; however, the apparent utilization of fluids in quantity leads to the conclusion that these are probably calibration test facilities.

Item 6, a large structure measuring 110 by 50 feet by 100 feet high, appeared to be incomplete in [REDACTED] the north and south ends were open, and the roof was not complete (Figure 9). The long walls are probably vertical, but they may slope inward slightly toward the top. The large-diameter overhead probable water pipeline, which originates outside the secured area west and south of item 6, is buried under the ground from a point just west of the building to a point immediately east of it, probably because the pipeline interfered with construction of item 6; a large feeder line from the overhead pipeline may enter the west side of the building. Three large horizontal tanks, two measuring [REDACTED] were visible on the ground approximately 160 feet southeast of the building; these could be fuel/oxidizer tanks or missile airframes. There appear to be buttresses or columns at the outside corners of the building. The apparently large-capacity water source is an indication that item 6 possibly is or will be involved with hydrostatic testing of some type; however, the size and configuration of the building indicate probable structural/vibration testing.

Items 7 and 8 form the north and south ends respectively of a test complex which also includes at least 9 other buildings, several of them quite small; a small metal peak-roofed tank; a deep rectangular concrete-lined pit or sump; and a probable battery of high-pressure tanks protected by a ribbed concrete wall [REDACTED] high. Most of the buildings in the complex, including items 7 and 8, are connected to steam and/or water pipelines. Components testing, particularly for valve and pump systems, appears to be a possible operation at this complex. However, the probable battery of high-pressure tanks and a tall structure immediately north of item 8 indicate a possible calibration test facility; the structure is [REDACTED] and is connected to the rectangular pit by an apparent trough.

Item 9 and the smaller building adjacent to it on the south probably constitute a storage and transfer facility for storable fuels or oxidizers. The [REDACTED] photography revealed 2 probable tank cars on the rail siding just north of item 9. A probable lightning rod is located just west of the larger structure.

Item 10 and the 2 buildings aligned with it immediately to the south have no distinguishing characteristics beyond the presence of probable steamlines serving the 2 unnumbered buildings and 4 moderately long, slender cylindrical objects on the ground east of the southernmost building.

Items 11 and 12 are the principal structures in another pair of duplicate facilities. Water, steam, and probable gas pipelines serve both structures, and water and steam pipelines enter the probable control/service building located in the center of the complex. A heavy-duty loop road provides access to all the structures in this

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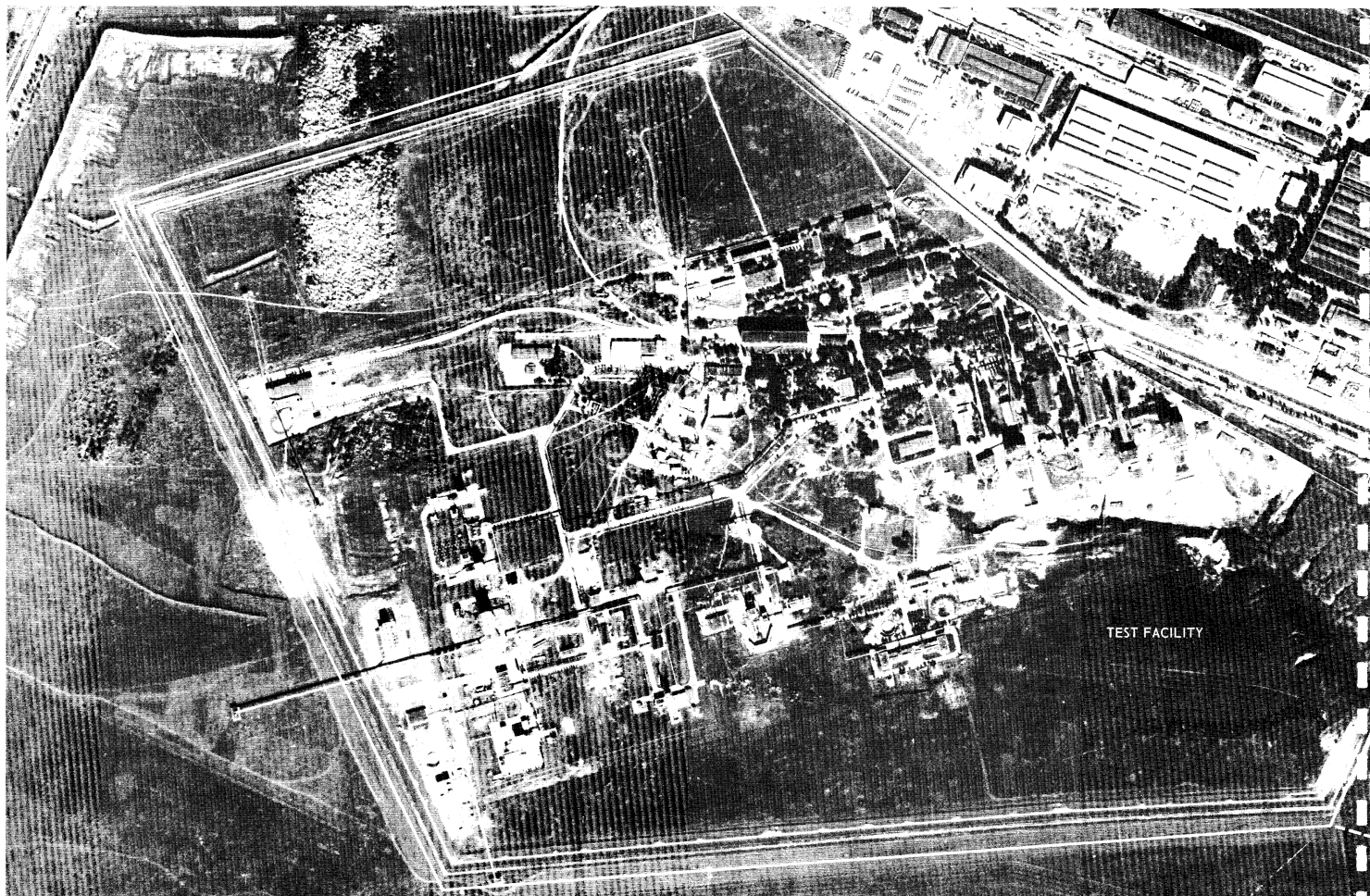


FIGURE 7. TEST FACILITY

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test complex. Because item 12 is essentially identical to item 11, the following description of the latter will also apply to item 12. The most prominent part of item 11 is a central tower section approximately [] this is flanked on the west by a section measuring [] feet high and on the east by a T-shaped section about 80 feet long. These support structures are connected to the tower section or closely adjacent to it. The tower section consists of 2 separate vertical elements joined at the top by a rectangular box-like structure; a tall metal pipe or stack protrudes from the top of the tower section. The vent pipe on item 12 may have a T-shaped configuration at or near its top. Two tanklike objects were visible in [] adjacent to item 11, apparently lying on the ground or on low cradles. In addition to the 2 principal structures, each of the duplicate facilities also includes a protected battery of probable high-pressure tanks, a small separate building, and a concrete-lined rectangular sump or pit which may have a pump housing at its bottom. The combination of sumps, water supplies, gas pressure systems, and tall slender towers indicates that these facilities are involved in hydrostatic and/or flow calibration testing.

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This pair of duplicate facilities incorporating items 11 and 12, like the pair including items 4 and 5 (described earlier), implies a testing capacity for considerable numbers of items; this observation in turn supports the conclusion that production testing is a major function of the DMDPC Test Facility.

Item 13 is the westernmost of a double line of 10 buildings which extends eastward and includes items 19 and 23 and the building south of item 23; this complex of buildings and adjacent equipment is apparently interrelated. This complex also includes 2 large aboveground tanks measuring 50 [] feet in diameter respectively which are probably used for gas storage. Item 13a, a long, narrow 2-part structure connected by a continuous roof, may be a pair of large cooling coils; item 13b appears to be either a bank of forced-draft cooling towers or a series of housed vertical pressure vessels. This latter item is also apparently the source of a large-diameter overhead pipeline which terminates at a very large probable calibration test facility to the south (items 14 and 15). Item 13 and the associated complex of buildings and equipment may be a gas production facility, an assumption supported by the pipeline connection with the largest probable calibration test facility at the DMDPC and by the presence of the 2 gas storage tanks, the probable cooling towers, and 3 large buildings; any one of these 3 buildings could be a compressor building, but the most likely is item 19 because of its proximity to the cooling equipment and the numerous pipe vents protruding through the roof. This complex of buildings and equipment, however, also has the necessary production elements, assuming the presence of a housed ammonia oxidizer, to produce nitrogen tetroxide in quantity. A large group of apparently fixed horizontal pressure tanks is situated immediately east of item 23; the tanks and the 2 small buildings associated with them may be an inplant gas, oxidizer, or cryogen distribution point.

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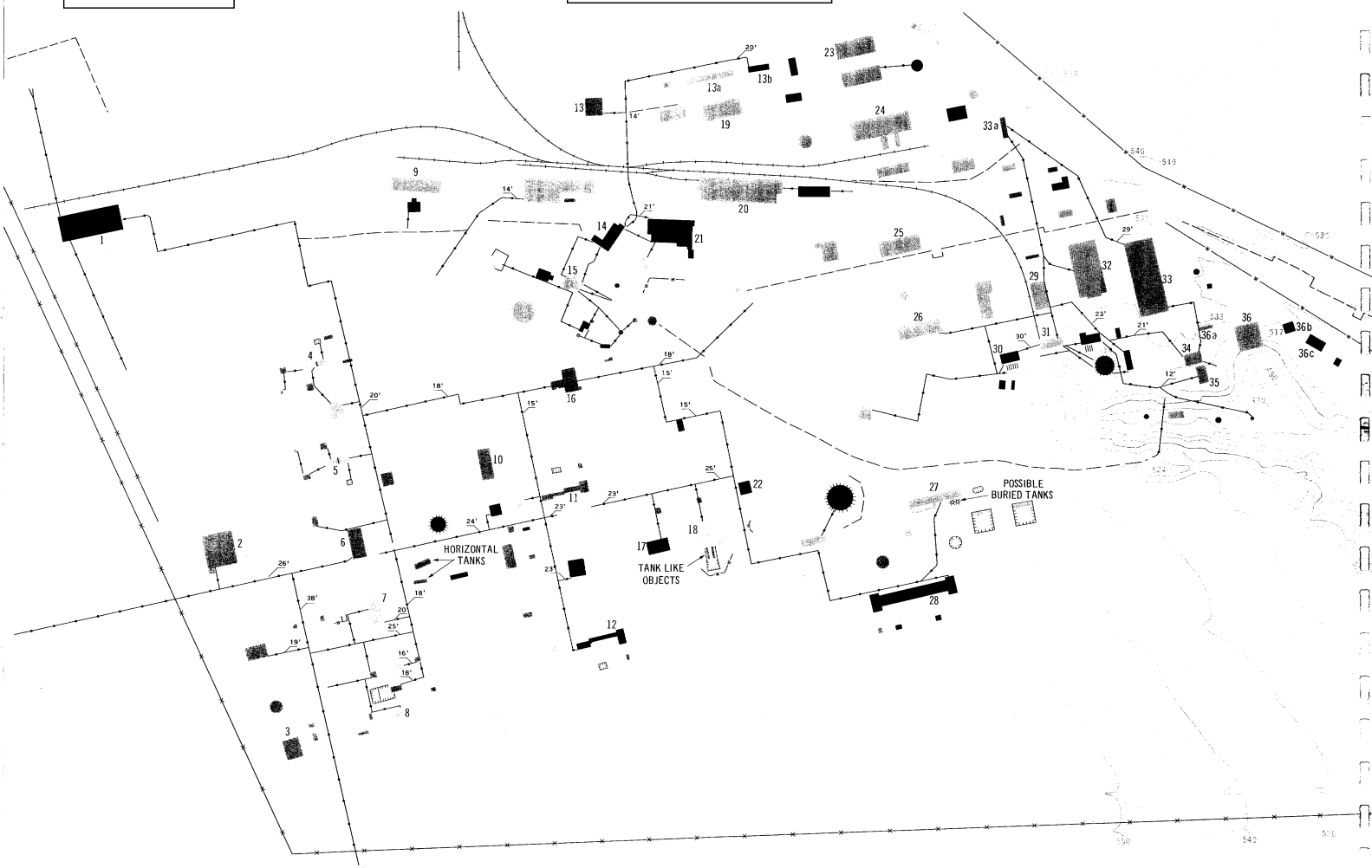
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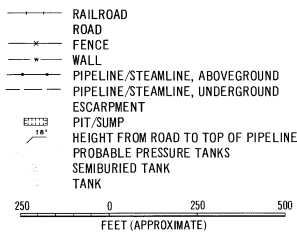
FIGURE 8. TEST FACILITY, LAYOUT AND ROOF COVERAGE.

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ITEM	DIMENSIONS			ROOF COVERAGE* (SQ FT)
	LENGTH (FT)	WIDTH (FT)	HEIGHT(S) (FT)	
1	195	x 90	25	17,550
2	Irregular			8,110
3	70	x 50		3,500
4	Irregular			5,380
5	Irregular			5,380
6	110	x 50		5,500
7	90	x 45		4,050
8				945
9				7,560
10				4,100
11	Irregular			2,875
12**	Irregular			3,200
13	65	x 60		3,900
14	Irregular		15, 20, 35	4,915
15	Irregular			1,935
16			10	3,200
17	75	x 45	15	3,375
18	Irregular			1,400
19				8,370
20	Irregular			21,500
21	Irregular			11,400
22				1,935
23	120	x 60		7,200
24				18,280
25	135	x 50		6,750
26	150	x 50		7,500
27	Irregular			4,110
28	Irregular			11,700
29				4,320
30	70	x 35		2,450
31				1,725
32	Irregular			17,640
33				22,860
34	60	x 45		2,700
35	Irregular			2,880
36	90	x 80		7,640
37	180	x 45		8,100
38				3,395
39	Irregular			3,350
40	65	x 15		975
41	Irregular			28,610
42				8,470
All other structures (approximate)				137,605
Total				438,340

GREEN INDICATES CONSTRUCTION BETWEEN [REDACTED] OR NOT PREVIOUSLY OBSERVED
 RED INDICATES CONSTRUCTION SINCE [REDACTED]
 HORIZONTAL SCALE IS ACCURATE TO WITHIN [REDACTED]
 STRUCTURE HEIGHTS AND SPOT ELEVATIONS ARE ACCURATE TO WITHIN ±5 FEET
 RELATIVE CONTOUR RELIABILITY IS ACCURATE TO WITHIN ±10 FEET
 CONTOUR INTERVAL IS 10 FEET

*Roof coverage for individual buildings rounded to nearest 5 square feet.
 **May be identical to item 11.

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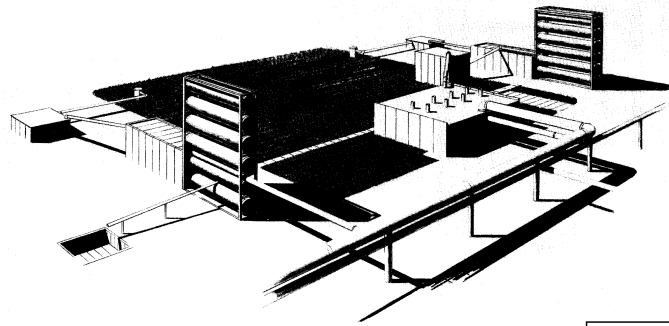
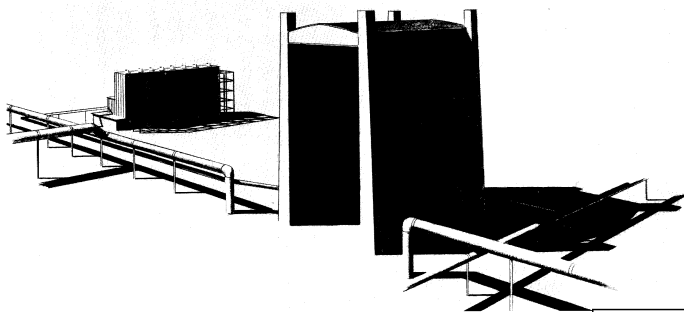


FIGURE 9. ARTIST'S CONCEPTION OF POSSIBLE STRUCTURAL TEST FACILITY AND POSSIBLE HYDROSTATIC OR STRUCTURAL/VIBRATION TEST FACILITY (items 2 and 6, Figure 8).

FIGURE 10. ARTIST'S CONCEPTION OF DUPLICATE PROBABLE CALIBRATION TEST FACILITIES (items 4 and 5, Figure 8).

Items 14 and 15 are the principal structures in a probable calibration test facility (Figure 11). The test tower (item 15) is linked to item 14 by a large, elaborate pipe gallery, 3 pipes high on the east side and 6 pipes high on the west. In addition to items 14 and 15, the following are also associated with this facility: 3 slender vertical tanks interconnected by overhead piping which is connected to the test tower, several small buildings, a large earth-mounded tank, and a large 2-row battery of probable high-pressure tanks enclosed on 3 sides by high concrete walls. The test tower is approximately 110 feet high; the top measures 40 by 30 feet and has 2 levels, the higher part being on the east side facing an inclined trough below. The trough conducts fluids into a probable collection sump, the bottom of which is approximately [redacted] below local grade level. At least 2 pipelines connect the base of the test tower and the sump, and there is a small building which may be a pumphouse at the lip of the sump; this system appears to be designed to recover the fluids used in testing. Item 14 appears to be the terminus of the pipeline that originates at item 13b, which is probably the source of the fluids carried in the pipeline; the path of the fluids from item 14 into the test tower is not discernible. The corral-like pipe gallery may carry the fluids from item 14, or this unusual collection of piping may be utilized to return expended fluids from the collection sump. The purpose of this pipe gallery appears to be related to the heat/pressure/state-of-matter of gases or cryogenics or a storable oxidizer such as nitrogen tetroxide.

Item 16 may be a support or service structure for the probable calibration test facility described above. In gross dimensions it measures 80 by 40 feet, and there is a small rectangular wing on the west side and a small free-standing tank immediately to the north.

Items 17 and 18 are the most prominent structures in another test complex (Figure 12). The complex includes 1 large towerlike building (item 18), a small towerlike building, a large building which could house compressors or be used for assembly operations (item 17), 4 smaller buildings (including item 22) whose purposes cannot be determined, and a large array of probable horizontal pressure tanks. The test stand proper (item 18) consists of a 2-level structure, the higher section of which is nearly 60 feet high; the lower section on the north side is about 30 feet high. Two large, horizontal, apparently cylindrical objects extend from the south side of the tower; the tanklike objects measure 50 by 5 feet each and are elevated about 10 feet above local grade level. A concrete-lined sump or pit under the cylinders extends north toward, and possibly under, the test stand and south to a 3-sided, [redacted] high ribbed concrete wall. The [redacted] photography revealed possible blast marks in the form of dark discolorations on the bottom of the pit. A large semiburied tank measuring 86 feet in diameter is located approximately 150 yards east of the test complex. This complex of structures and equipment which are functionally related is probably a "hot-fire" altitude simulating test facility for either engines or upper stages.

Item 19 is described above with item 13. Item 20 is a large 2-level building measuring about 275 by 80 feet; it is served by 2 rail spurs on the north side, and a third spur enters the west end of the building. The high-bay section on the north is approximately 50 feet high and has 5 pipe vents and a short longitudinal monitor on the roof; 2 large-diameter pipelines traverse the roof of the low-bay section. This configuration, a high bay with a connected lower section, indicates a shop and assembly operation, possibly in support of the adjacent test complex (item 21).

Item 21, measuring 150 feet long and varying in width from 50 [redacted] feet, has a very complex array of piping on or above its roof; a large probable flame pit shaped like a squared U adjoins the south side of the building. A system of high concrete walls and a large earth revetment practically enclose the pit on 3 sides; the southern end of the flame pit has a deeper section which appears to be a sump to collect coolant fluid. The size and shape of the building and its associated pit indicate that this is probably a 2-position, horizontal "hot-fire" engine test facility, probably for units of relatively small thrust. Similar facilities have been observed at Faustovo and other sites in the USSR. 4/

Item 22 is described above with items 17 and 18.

Item 23 is described above with item 13.

Item 24 is a large 2-level building measuring approximately [redacted] 2 apparent canopies or marquees extend from the south side to a railroad loading dock which is parallel to the length of the building. The [redacted] photography revealed 4 large crates or trailers with crates between the building and the rail siding; these objects measured about [redacted]. At the same time, 2 ordinary boxcars were parked opposite the marquees. A possible crane is located in the open space near the southwest corner of the building. This is probably a shipping facility which may also be involved in receiving operations.

Items 25 and 26 appear to be laboratory and/or administration buildings.

Items 27 and 28 are the principal buildings in a test complex which also includes 2 small buildings; a medium-size building; a lined (probably with concrete) circular pit; a tank which was being buried in [redacted] 2 rectangular concrete-lined pits, each of which has a structure with 3 vents built below grade against the north side; and a small, nearly oval, lined pit. Item 27 is a 2-level

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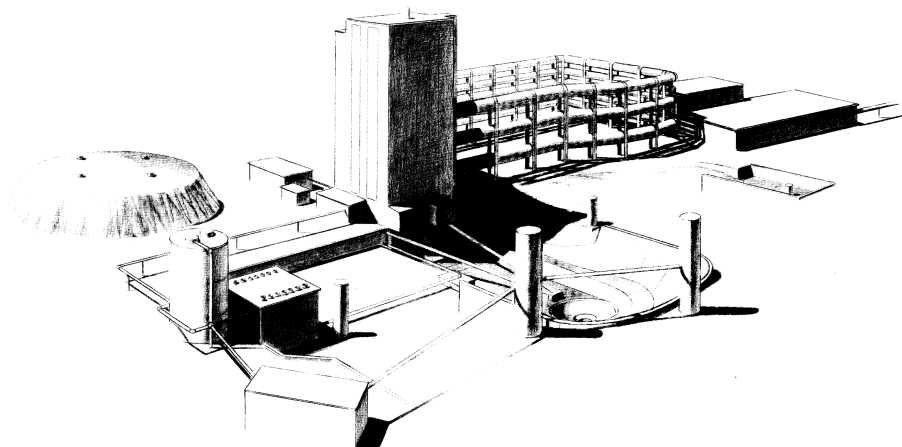


FIGURE 11. ARTIST'S CONCEPTION OF PROBABLE CALIBRATION TEST FACILITY (items 14 and 15, Figure 8).

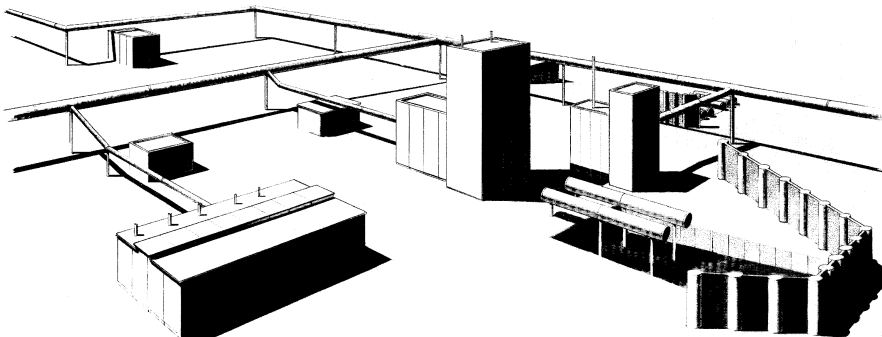


FIGURE 12. ARTIST'S CONCEPTION OF PROBABLE ALTITUDE SIMULATING TEST FACILITY (items 17 and 18, Figure 8).

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structure with a roofless enclosure built against the south side of the higher half of the building. A steam and/or water pipeline enters the south side of item 27 at about the midpoint, immediately under a square tower section which extends about 5 feet above the higher half; 2 possible buried tanks are adjacent to the south side, near the east end. An excavation, possibly for another tank, is located near the west end of the same side. Item 28, the terminus of the large water pipeline originating outside the south and west boundaries of the Test Facility, is a symmetrical building with a short wing at each end; the wings are about [] higher than the center section. South of this building are 2 small buildings and a group of possible pressure tanks arranged in a row parallel to item 28. Of the 2 circular configurations just north of item 28, the western one appears to be an incomplete tank which will be earth covered when complete; the other, which has not changed appreciably during at least the past 2 years, is a circular pit or excavation with a raised earthen rim. The [] photography revealed 2 small columns of smoke rising from the bottom of this pit, an indication that it is possibly used to test or dispose of small rocket motors such as vernier or retro types; however, it might be a centrifuge for spin testing this class of rocket motors. The specific purpose of this test complex cannot be determined; the large water supply pipeline is evidence of possible hydraulic or hydrodynamic testing of some kind, and the complex may be involved in components tests, although the type of tests and the kind of components cannot be specified.

Items 29, 30, and 31 are the principal structures in a "hot-fire" rocket engine test complex (Figure 13). Item 29 is probably the checkout building for the 2-position test stand (item 31); item 30 and a similar structure immediately east of the test stand appear to be support buildings for the stand. Each of these support buildings has a large array of probable horizontal pressure tanks; one may pressurize the fuel supply and the other, the oxidizer. The 2-position test stand consists of 3 vertical bays, the outside 2 being the firing bays and measuring 80 feet high. Twin flame deflectors, possibly cooled by a pair of large overhead water supply pipelines, extend out and down from the 2 firing bays to a point approximately 40 feet below the local grade level. A sump extends south from the lower end of each deflector for about 70 feet; these sumps are about 5 feet deep and enclosed on all 4 sides. The center section of the test stand, probably the service bay, is slightly taller than the firing bays, measuring []. A large buried tank measuring [] in diameter is directly east of the test stand and connected to it by piping; this tank is probably used for fuel storage. A probable control/observation structure is located immediately south of item 30.

Item 32 is a large multilevel structure with a monitor-roofed high bay approximately []; this building is located midway between the 2 large, vertical "hot-fire" test stands. Although the operation housed in this structure cannot be deter-

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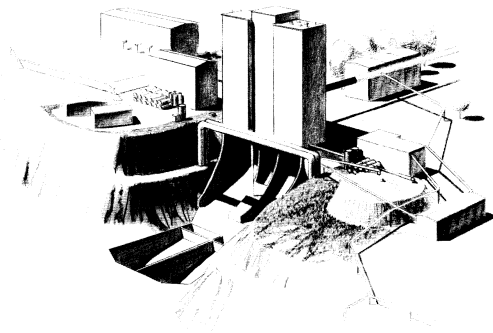


FIGURE 13. ARTIST'S CONCEPTION OF 2-POSITION TEST STAND (items 29, 30, and 31, Figure 8).

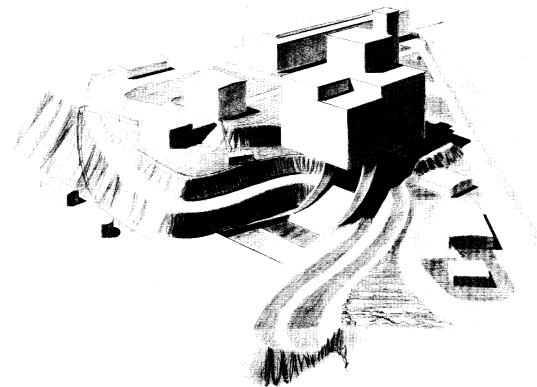


FIGURE 14. ARTIST'S CONCEPTION OF SINGLE-POSITION TEST STAND (items 34, 35, and 36, Figure 8).

mined from photography, the size and configuration indicate that it may be a checkout/assembly building.

Item 33 is a large 2-level structure measuring about 100 feet; 8 to 10 short stacks protrude through the roof of the high section, which is approximately 40 feet high. A 115-foot metal stack is located near the northeast corner of item 33. A large-diameter overhead pipeline appears to originate in the northwest corner of the building; 3 or 4 branches of the pipeline are discernible above the low-bay roof, 2 of these emerging from the side of the high bay and the third (and possible fourth) emerging either through the roof or the side or the low bay. All the branches of the pipeline join to form a single conduit above the roof; the pipeline then extends about 200 yards to the northwest and enters the roof of a relatively small building (item 33a) largely hidden by surrounding trees. Another overhead pipeline of similar or slightly smaller diameter emerges from the roof of item 33a and continues directly to item 31, the 2-position test stand described above; this pipeline may be tapped in 1 or more places by feeder lines supplying other buildings in the vicinity. Two alternate interpretations of items 33 and 33a and their associated pipelines appear to be logical: 1) item 33 has some of the characteristics of a large compressor building of the type used for air liquefaction, and the pipelines could carry either a gaseous or a liquid product, such as an oxidizer or nitrogen for pressuriza-

tion/purging; item 33a could then be a structure to house pumps, valves, or additional compressors for handling a gaseous product from item 33; 2) if the pipelines are considered overhead water supply lines, item 33a would be a pumphouse and source of the pipelines; then 1 pipeline would provide coolant to the 2-position test stand and the other to whatever equipment is located in item 33. A small, vertical aboveground tank is visible just east of item 33.

Items 34, 35, and 36 are the principal structures in a probable single-position, "hot-fire" rocket engine test complex (Figure 14). Item 36 is a large, multilevel, single-position test stand which measures 90 by 80 feet in plan dimensions; the main or highest part of the tower structure rises approximately 80 feet above local grade level, and the lowest part of the flame deflector is about 10 feet below the same level. A large coolant collection sump with a maximum depth of about 5 feet extends southward from the foot of the flame deflector for a distance of about 65 feet. Small-diameter pipelines emerge from item 35, indicating that this structure may be a fuel-handling facility; item 34 is adjacent to the main access road to the test stand and therefore may be a checkout/minor assembly building. Because of its location in the complex, item 36c is probably a control or observation structure; the location of item 36b indicates that this structure may serve a similar purpose. A tall, probably square, lattice-work tower is attached

to the west side of item 36b; although the purpose of this tower is not readily apparent, it may be a permanent fire-fighting apparatus. Item 36a is a probable battery of horizontal pressure tanks arranged in a double row against a small building on the south side.

Test Facility Annex

The considerable group of facilities in the Test Facility Annex (Figures 7 and 8) cannot be identified in specific terms. However, the separate security measures and locations of some of these buildings indicate that one or more of them may be used for developmental work on small components or possibly on fuels or control mechanisms. Some of these structures in the annex area might be used for the assembly, testing, and transient storage of small components for rockets or rocket engines, such as guidance or steering mechanisms or servomechanisms for flow-rate control.

Item 37 is a large warehouse-type building; it has been numbered mainly to serve as a size/scale reference point for this section of the DMDC.

Item 38 is one of a number of buildings in a separately secured area; this compound also contains 7 other structures, a small building in the northeast corner with an apparent below-grade entrance, and an elaborate road pattern. This complex could be a series of small laboratories with their associated stor-

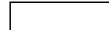
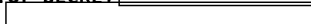
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age and maintenance buildings. Item 38a may be a drainage channel with 2 small possible structures at the lower or southern end where it drops into the natural drainage pattern. There is some evidence, although it is not conclusive, that this drainage system extends underground and north into the secured compound where item 38 is located; if this interpretation is correct, the special drainage system might be used for the disposal of toxic wastes resulting from research and development operations using "exotic" fuels. Item 38b is a graded rectangular surface, possibly partially paved, measuring about 340 by 30 feet; the southern extremity ends at a vertical, below-grade structure which may be a retaining wall. Because this long surface was cut out of the facing banks of a valley originating inside the Test Facility security wall, most of the surface is below grade level. The configuration indicates that this may be a small firing range for horizontally mounted test items.

Item 39 consists of 2 buildings connected by a subdivided walled enclosure. The adjacent item 39a consists of another walled enclosure with a small building in the center and 3 small struc-

tures adjoining the outside of the wall. A rectangular excavation is located immediately south of item 39a. The wall systems of items 39 and 39a indicate that this area may be involved in work with or storage of small hazardous components or small quantities of hazardous materials of the type associated with ignitor devices or explosive bolts.

Item 40 is one of 5 essentially similar buildings, each of which has numerous small symmetrical projections above its roof; they are situated within and along the east side of a walled compound which also encloses at least 2 other buildings; 3 very small objects, of which two may be trucks; and a large, rectangular concrete pad with a low towerlike structure near its center. The presence of the pad and tower indicates that this may be some type of drop-test facility.

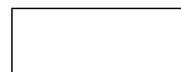
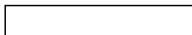
Items 41 and 42, both large buildings, appear to be manufacturing or processing structures. Item 42a is a battery of large, horizontal probable low-pressure tanks; the [redacted] photography revealed 12 tanks, but because there may be 2 or 3 layers in the battery, there may actually be a total of 24 or 36 tanks.

A considerable amount of construction activity was visible in the vicinity of items 41, 42, and 42a in October. The large array of tanks indicates that the processing buildings will possibly be utilized in the production of some kind of fluid. An alternate interpretation is that the battery of horizontal tanks is a steam accumulator and that the main building (item 41) is an altitude test facility. A similar group of structures, including a large L-shaped building, an associated building, and an array of large horizontal tanks, has been identified at the Zaporozhye Aircraft Engine Plant No 478. 5/ At the Zaporozhye facility there are 3 to 5 apparent exhaust stacks arranged along the long side of the L-shaped building; construction activity adjacent to the comparable building at the DMDPC indicates that similar stacks may be built there. Both sets of facilities were probably started early in 1962; the Zaporozhye facility appeared complete in [redacted], and the DMDPC facility was still under construction in [redacted]. These structures might also be interpreted as a manufacturing/assembly/test facility for fuel and/or oxidizer injector systems with the horizontal tanks being used for fluid sources or for pressurization.

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REQUIREMENT

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